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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/824,310

04/13/2004

Junko Yotani

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8791 7590 07/30/2007  
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EXAMINER

STOUFFER, KELLY M

ART UNIT

PAPER NUMBER

1762

MAIL DATE

DELIVERY MODE

07/30/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

**Application No.**

10/824,310

**Applicant(s)**

YOTANI ET AL.

**Examiner**

Kelly Stouffer

**Art Unit**

1762

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 15 June 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9 May 2007 has been entered.

### ***Response to Arguments***

2. Applicant's arguments filed 2 May 2007 have been fully considered but they are not persuasive. The applicant argues that Uemura et al. in view of Liu et al. does not include increasing the number of ends of the fibers. However, as was stated in the previous office action, Liu et al. uses the laser to remove nanotubes from the ends of other nanotubes to remove catalyst byproducts and unwanted amorphous carbon (paragraph 0024). Liu et al. also discusses that the tips of the invention contribute to a decreased threshold voltage required for field emission (paragraph 0026). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention for Liu et al. to include using the laser to remove nanotubes from the ends of other nanotubes not only to remove catalyst byproducts and unwanted amorphous carbon,

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but to create more ends of nanotubes so that the free ends can contribute to a more decreased threshold voltage required for field emission.

The applicant further argues that there is no motivation to combine the references because one of ordinary skill in the art would not be motivated to replace the perpendicular nanotubes of Liu by the curled nanotubes of Uemura because this structure would be contrary to that of Liu. However, the examiner notes that this rejection is made under Uemura et al. in view of Liu et al. The elements of Liu et al., the secondary reference, would not be replaced by the primary reference Uemura et al. Further, as was stated in the previous office action, Uemura et al. shows all of the elements of the applicants' claimed invention in claim 1, except for smoothing the fibers by irradiation with a laser to create more loose ends of the fibers. Liu et al. teaches (or makes obvious) this feature to one of ordinary skill in the art at the time of the invention to remove byproducts on the nanofilm surface, to make a smoother surface, and to decrease threshold voltage required by field emission by the nanotubes (see passages cited above and in the final office action of 15 February 2007). The examiner does not suggest that one should replace the perpendicular nanotubes of Liu with the curled nanotubes of Uemura. Neither reference suggests that because of orientation to the substrate, laser smoothing would not be functional in both cases and there is a reasonable expectation for success for combining the nanotubes of Uemura with the laser smoothing process of Liu. It is further noted by the examiner, that nanotubes appear to be grown by Uemura perpendicular to the substrate in the figures. One cannot show nonobviousness by attacking references individually where the rejections

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are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Therefore, the rejections of the previous office action are maintained and repeated here in their entirety.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

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consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent publication 2001/0028209 to Uemura et al. in view of US Patent publication 2004/0095050 to Liu et al.

Regarding claim 1, Uemura et al. includes a method of manufacturing an electron-emitting source (entire document) by forming a film containing curled nanotube fibers on a substrate (paragraph 0025). Uemura et al. desires the curled fibers to be smoothed by an electric field so that the light emitting density of the phosphor screen caused by electron irradiation from the source becomes uniform (paragraph 0042). Uemura et al. does not include smoothing the fibers by irradiation with a laser. Liu et al. teaches using a laser to irradiate the nanotubes perpendicular to the surface (paragraphs 0022-0024) to smooth the surface more than that of the method taught by Uemura et al. and also removes byproducts on the nanotube surface, further improving electron emission (paragraph 0024). Liu et al. uses the laser to remove nanotubes from the ends of other nanotubes on the substrate to remove catalyst byproducts and unwanted amorphous carbon (paragraph 0024). Liu et al. also discusses freeing more ends of nanotubes by this procedure because the tips of the invention contribute to a decreased threshold voltage required for field emission (paragraph 0026).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Uemura et al. to include using a laser to make the nanotube surface

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more uniform instead of an electric field as taught by Liu et al. in order to remove byproducts on the nanotube film surface and make a smoother surface.

Regarding claims 2-4, Uemura et al. discloses the nanotubes as carbon (paragraph 0024) the substrate as iron (paragraph 0045) and the nanotubes formed by thermal chemical vapor deposition (paragraph 0049).

Regarding claims 5-7, Liu et al. discloses the laser as an excimer laser with energy density of  $300 \text{ mJ/cm}^2$  and used in air at less than 1 standard atmospheric pressure (paragraph 0024).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kelly Stouffer whose telephone number is (571) 272-2668. The examiner can normally be reached on Monday - Thursday 7:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Kelly Stouffer  
Examiner  
Art Unit 1762

kms



TIMOTHY MEEKS  
SUPERVISORY PATENT EXAMINER